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Via Electronic Mail

September 4, 2018

Joseph A. Gowers
Remedial Project Manager
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USEPA Region II
290 Broadway, 19th Floor
New York, New York 10007-1866

Re: Ringwood Mines/Landfill Superfund Site
Groundwater RIR Addendum
Response to Comments

Dear Mr. Gowers:

On behalf of Ford Motor Company (Ford), this letter provides a response to the comments communicated in your letter dated May 18, 2018 regarding the October 2017 *Site-Related Groundwater Remedial Investigation Report Addendum* (RIR Addendum) prepared by Cornerstone Engineering Group, LLC for the Ringwood Mines/Landfill Superfund Site (the Site). This response to comments also reflects the discussions with the USEPA and the NJDEP during a conference call on June 6, 2018. The USEPA's comments are reiterated below in italics, followed by responses in standard font.

General Comments:

1. The RIR Addendum does not include an "Uncertainty Section" in the narratives. All modeling studies have some degree of "uncertainty" and this must be discussed in the report. In this instance, the primary uncertainty lies in the fact that we do not know for sure if the bedrock wells installed in the Peters Mine Pit area and downgradient in the O'Connor Disposal Area are intercepting all potential migration pathways. For example, bedrock wells RW-15D and RW16 may be too shallow to intercept the fracture zone that appears to have higher 1,4-Dioxane levels as seen in RW-3DS, RW-3DD, and RW-11D. Accordingly, the fact that modeling runs match the collected data from the monitor wells does not prove beyond all doubt that the Contaminants of Concern (COCs) are not migrating along different pathways within fractured bedrock. An "Uncertainty Section" must be added to the RIR Addendum to discussing these types of uncertainty.

An uncertainty section has been added to the RIR Addendum. However, the uncertainty section is limited based on the use of the model as a screening tool only. As described in the RIR Addendum, the model correlates to empirical data, and along with the understanding of the Site and groundwater flow from the other components of the Remedial Investigation (RI), it supports the conclusion of the RIR Addendum which is to proceed to the Groundwater Focused Feasibility Study (FFS). The BIOCHLOR model is not used to prove any conclusions "beyond all doubt", and as noted in prior discussions with the USEPA, and as discussed in the *Memorandum of Candidate Technologies for Site-Related Groundwater* (CTM), sentinel wells will be a part of each of the remedial action alternatives to confirm where groundwater quality standards (GWQS) are met.

2. *The RIR Addendum should include a discussion on the limitations of the BIOCHLOR model, in particular how it oversimplifies a complicated geologic environment such as the one found at the Ringwood site.*

See the response to comment No. 1. A discussion of model limitations is included in the uncertainty section, and is in the context of how the model is used.

3. *The RIR Addendum indicates that the extent of 1,4-dioxane contamination has been delineated. No figures depicting concentrations in groundwater or surface water are included. The report should be revised to include separate figures for concentrations in the overburden, bedrock and surface water. In addition, at least one cross section should also be prepared to illustrate the distribution showing flow paths between groundwater and surface water and shallow groundwater and deeper groundwater. (Note that the BIOCHLOR screening for 1,4-dioxane transport indicated a flow path for the contaminant which should be shown on a figure.) Once these figures are prepared data gaps can be identified. For example, not all depth intervals were included in the 1,4-dioxane sampling and these may need to be included in future sampling events to determine the vertical distribution so that remedial efforts are effective.*

The RIR Addendum does not indicate that delineation based on groundwater quality data is complete for 1,4-dioxane to its GWQS. The RIR Addendum, on Page 15 (page references are to the originally submitted report), discusses the status of delineation of 1,4-dioxane and is clear that the farthest down-gradient well from the PMP Area, RW-15D, has detections of 1,4-dioxane nominally above the GWQS. The BIOCHLOR model along with the understanding of groundwater flow are then used to predict that the concentrations of 1,4-dioxane down gradient of the PMP Area will decline to below the GWQS on Site. This prediction is used to conclude that the RI is complete and the FFS can proceed.

Figures illustrating the distribution of 1,4-dioxane in groundwater (overburden and bedrock) and surface water were provided in Appendix C of the RIR Addendum. However, based on discussions during the June 6, 2018 conference call, the figures from the August 2017 annual sampling event are presented as report figures in the RIR Addendum. In addition, per a request by the USEPA during the June 6, 2018

conference call, 1,4-dioxane isoconcentration maps for overburden and bedrock groundwater have been added to the RIR Addendum figures. Last, a new cross section has been prepared to supplement the existing figures and illustrate the transect along which data were used for calibration of the BIOCHLOR modeling simulations.

This comment also indicates that not all depth intervals were sampled for 1,4-dioxane. The USEPA clarified during the June 6, 2018 conference call that the intent of this comment is that sentinel wells as a part of the future remedial action selected for groundwater may require sampling intervals at greater depths.

4. The RIR Addendum does not include any type of private potable well search information that will help the reader understand that all potential receptors have been considered and evaluated. Potable well search evaluation and information must be included in the final RIR.

The January 2015 RIR documents that the nearby residents are provided with municipal water primarily from the Borough of Ringwood's production wells that are located in a separate sub-watershed. The Borough of Ringwood has also verified that municipal water is provided to the residents around the Site. However, a new private well search through the NJDEP is provided in the revised RIR Addendum, and the NJDEP well records search was field verified, and sampling and analysis was performed of potable wells adjacent to the Site (Eleanor G. Hewitt School and Ringwood Manor State Park wells). The results of the well search and sampling are presented in a new Section 1.3 of the RIR Addendum and in Appendix A.

5. The RIR Addendum states that "no discrete sources" were identified for the COCs in groundwater. This statement is a little misleading. The Peters Mine Pit and the mine workings connected to the Pit can be considered a "source area". While it is true that no single point/location, single discharge/release or drum was identified during the RI phases, the agencies would consider the Pit and the Air Shaft as points of origin for the COCs found in ground water. Both the Peters Mine Pit and the Air Shaft are considered "contaminated areas of concern" that warrant evaluation in the Feasibility Study when evaluating remedial options for contaminated ground water. The RIR Addendum should be revised accordingly.

The issue of defining a "discrete source" was resolved in the CTM, which was approved by the USEPA on April 4, 2018. The language used in the CTM to clarify this issue is as follows:

> "… an identifiable, discrete source refers to an individually distinct source separate from potential contributions of COCs from the larger waste/fill mass in the land ACs, or from naturally occurring sources and the larger mine workings, any of which may be contributing COCs to groundwater. This distinction is important in assessing remedial action alternatives that are practicable for an identifiable, discrete source, but impracticable for addressing a large waste mass that may contribute COCs, but in a diffuse manner."

Further, the CTM does evaluate alternatives for the PMP and Air Shaft and, as described in the CTM, alternatives to address the PMP are not carried forward to the FFS because of the impracticability for addressing a large solid waste mass, but alternatives to address groundwater down gradient of the PMP are carried forward to the FFS. In addition, three alternatives presented in the CTM are carried forward to the FFS for the PMP Air Shaft. We believe the RIR Addendum is consistent with the CTM; however, to address these comments, the RIR Addendum has been reviewed for consistency with the understanding of how these issues will be handled, as presented in the USEPA approved CTM.

6. The term "mine water" is used throughout the RIR Addendum when discussing the sampling of the Peter's Mine Air Shaft and the Cannon Mine Shaft. This term should not be used in this document since these shafts have connection to the surrounding aquifer (the shafts are not sealed or cased) and the water in these conduits have not been proven to be solely mine water. The RIR Addendum should be revised accordingly.

The term mine water is an important distinction applied to the water quality characterization data from the mine structures that has been used in numerous prior documents and should not be removed from the RIR Addendum. The water contained in the mine structures is largely stagnant and, when sampled, is distinctly different from sampling of a groundwater monitoring well in that the stagnant water cannot be purged or removed because of the large volume of water associated with the mine structures. Comparison of analytical results of water samples collected from the mine structures directly to water samples collected from properly purged monitoring wells should, therefore, be made with this distinction clearly in mind. Referring to water samples collected from the PMP Air Shaft and the CMP Shaft as "mine water" was initiated during the RI for this reason. Neither the RIR nor RIR Addendum indicates that the water in the mine structures is isolated from groundwater, and the language in the RIR Addendum was reviewed to confirm that an appropriate characterization of bedrock interconnectivity with the mine structures is provided. Overall, we believe mine water is the correct term to describe the water contained in the mine structures and the terminology has been maintained.

7. 1,4-dioxane detected in surface water at levels which do not exceed the 22,000 ug/L ecologically-based screening level must be discussed in the RIR Addendum. Currently, only those detections that exceed the ecologically based screening value of 22,000 ug/L are included in Tables 6 and 7 of the report. Mapping the locations where 1,4-dioxane are detected in surface water is critical information in determining the transport pathway for this contaminant and thus in developing an effective remediation strategy. Concentrations of 1,4-dioxane detected in surface water should also be compared to the New Jersey Groundwater Quality Standard of 0.4 ug/L, given that surface water at the site discharges to tributaries of the Wanaque Reservoir. The RIR Addendum should be revised accordingly.

We believe this comment was resolved for the approved CTM. The wording used in the approved CTM is "Comparison to the GWQS is provided as a point of reference,

but GWQS are not applicable to surface water quality, and are not applicable to a surface water ecological assessment." With this clarification, the RIR Addendum tables have been updated to provide comparisons of the surface water 1,4-dioxane concentrations to the GWQS.

Specific Comments:

1. Page 4, First Full Paragraph – This paragraph erroneously indicates that benzene is limited to the PMP Area. Please note that benzene has historically been detected in samples collected from well RW-8 at levels which exceed the GWQS of 1 ug/L. This paragraph should be revised accordingly.

The intent of this paragraph is to indicate the benzene is predominantly found in the PMP Area and not in the CMP area. However, the language has been modified to indicate that benzene has been detected predominantly in the PMP Area, with sporadic detections at monitoring well RW-8. Of note, data from monitoring well RW-8 show that benzene does not typically occur in groundwater in the CMP Area by comparison to the more frequent detections of benzene in the PMP Area. At the CMP Area RW-8 monitoring well location, a total of 24 samples have been analyzed for benzene since 2008 (various depth intervals). Benzene has been detected at low, estimated values in 11 of these samples (the other 13 samples have been non-detect), with 8 of the 11 detections below the 1 ug/L GWQS and one sample at the GWQS. Only two of the 11 samples reported benzene slightly above the GWQS of 1 ug/L and one of these detections was an estimated 'J" value.

2. Page 4, Second Full Paragraph – This paragraph must be revised to clearly note that benzene has been detected in paint sludge disposed of at the site.

This paragraph has been edited to indicate the potential for benzene to also be associated with paint waste, although this paragraph already acknowledges that the Site-related COCs are associated with historical disposal practices, but could also be associated with the larger mine workings or in some cases natural sources.

3. Page 5, Second Full Paragraph – This paragraph must be revised to reflect the fact that 1,4-dioxane has been detected in overburden wells located near Sally's Pond.

This paragraph has been edited to indicate that detections of 1,4-dioxane above its GWQS are not found in groundwater off Site, but detections below the 0.4 ug/L GWQS have occurred in overburden monitoring wells OB-10 and OB-29.

4. Section 1.2, Page 5 and Section 4.0, Page 15 - The RIR Addendum states that "...Benzene concentrations are decreasing...primarily due to biodegradation...", and, that "...biodegradation was affirmatively established from the stable isotope probing performed...". While this is true to a certain extent, the isotope probing study did not affirm any biodegradation of benzene within the PMP Air Shaft. In fact, the concentrations of benzene

within the Air Shaft have remained constant for many years. The report must acknowledge this and accurately reflect that the PMP Air Shaft can be considered a continuing "source area" for the ground water COCs.

The stable isotope probing and Bio-Trap® study did demonstrate biodegradation within the PMP Air Shaft. Bio-Trap® samplers were deployed at the 180 and 230-foot intervals within the PMP Air Shaft, and as for the other samples in the study, conclusively showed incorporation of ^{13}C into the biomass demonstrating that biodegradation is occurring in the PMP Air Shaft. The rate of biodegradation in the Air Shaft is less than at other locations but the stable isotope probing data confirm that it is occurring. The language in Section 4 has been edited to indicate the lower rate of biodegradation in the mine water.

5. Page 6, Table - The well ID OB-31 is repeated, and OB-32 is omitted. Please correct.

This typographical error has been corrected.

6. Page 8 - The language on this page needs to be modified to be clearer regarding the results of the downhole caliper log. The document states that "the caliper log revealed typical fracturing, but nothing unusual...".

The language has been clarified by adding the wording "(i.e., indication of a mine structure)". The discussion of RW-16 continues on this page with the results of the video log that confirmed the fractures observed on the caliper log, and no other anomalies.

7. Page 10, Section 3.1.1, First Paragraph – The phrase, "are not repeatable" in the second sentence should be changed to "have not been replicated".

This change has been made.

8. Page 14, Section 3.4, Last Paragraph - The phrase, "are not repeatable" in the second sentence should be changed to "have not been replicated".

This change has been made.

9. Page 15 - The introduction in Section 4 of this report overstates the work that has been done at the site. While extensive groundwater sampling has been conducted, work to understand the groundwater flow pathways in the fractured rock and the connectivity of the fractures has been limited. No hydraulic connectivity testing (i.e., pumping tests) have been conducted this site which would give more insight to the flow of groundwater and mine water.

The scope of the Supplemental RI conducted at the Site in 2012 was reviewed and approved by the agencies prior to implementation and it was multi-faceted and

extensive. Pump testing was not included for reasons that have been previously discussed with the agencies, however, a wide range of environmental tracer analyses were conducted and conclusions regarding connectivity of the bedrock fractures were presented. Further, the results of the 1,4-dioxane analyses that have been conducted since 2015 corroborate the groundwater flow pathways that were identified in the January 2015 RIR. The introductory wording in this section is consistent with the USEPA approved January 2015 RIR. As such, we believe that it accurately states the extensive work that has been performed at the Site. The USEPA provided a similar comment during its review of the CTM, and based on the manner in which the CTM comment was resolved, a minor change to the wording in this section has been made in the first bullet point, as follows:

- The Site investigations have resulted in an understanding of the flow of groundwater, mine water and surface water;

10. Page 16, Section 4.1 - The RIR Addendum states that "...the 1,4-Dioxane concentrations in groundwater at the CMP Area well RW-2 specifically, and in general in the CMP Area, cannot be linked to a specific source or to past disposal practices." The Agencies disagree with this conclusion and the statement should be omitted. While it may be true that no "paint wastes disposal activities" were documented in the specific area of the CMP Air Shaft, it must be noted that the CMP Air Shaft is directly connected to the CM Pit and that the CMP Air Shaft is downgradient of the Cannon Mine Pit and nearby SRs where some dumping did occur. RW-2 is adjacent to the CMP Air Shaft and likely monitors the same ground waters found in the Air Shaft and ground waters upgradient at the CM Pit and nearby SRs. The "CMP Area" can be considered a "source area" similar to the PMP Area.

Within the shallow bedrock groundwater in the CMP Area, 1,4-dioxane has not been detected or is found below its GWQS. Also, well SC-02, the monitoring well directly within the CMP, has not had a detection of 1,4-dioxane. Therefore, correlating the 1,4-dioxane detection at RW-2, 280 feet below grade, to the CMP or former surficial paint waste areas is not supported by the groundwater quality data. A more accurate reflection of the groundwater quality data is the language that is in the USEPA-approved CTM, as follows:

> "1,4-dioxane detected in CMP Area bedrock monitoring well RW-2 at depth (279'-289' interval) and in the deep CMP Shaft but not in the shallow bedrock suggests a potential link to the larger mine workings and historic mining operations at the Site."

However, based on the discussions during the June 6, 2018 conference call the wording in this section has been edited to indicate that the 1,4-dioxane concentrations detected in the CMP Area "are not likely" linked to a specific source "and may not be associated with" past disposal practices.

11. Page 18, Top of Page – This section should be revised to reflect that the NJGWQS for 1,4-dioxane is 0.4 ug/L rather than 0.04 ug/L.

This typographical error has been corrected.

Note: The RIR Addendum has also been updated to reference the change from an Interim Specific GWQS to a GWQS for 1,4-dioxane that occurred during the intervening period since the RIR Addendum was submitted to the USEPA.

12. Page 19, Section 4.2, Source Data - Indicate why the 144 ug/1 detection for 1,4-Dioxane presented in Table 9 for August 2017 was not used in the modeling effort.

As explained in the RIR Addendum, the 129 ug/L 1,4-dioxane concentration was selected as conservative for the entire 50' interval from 180 to 230 feet within the PMP Air Shaft because the analytical result for the 180-foot interval for the same sampling event was 15.2 ug/L, and therefore, the mean concentration in this 50' interval would be less than the maximum. Nonetheless, as further discussed in the RIR Addendum on page 20, the highest reported 1,4-dioxane concentration to date of 146 ug/L in the PMP Air Shaft 230-foot interval was also modeled. We believe this comment has already been adequately addressed in the RIR Addendum.

13. Page 29, Section 5 - Data gaps need to be identified and included in the summary and conclusions section. For example, additional wells will be necessary at some point to monitor any potential migration of site related contaminants of concern past the site boundaries.

We do not believe that there are any data gaps with respect to the conclusion that the RI is complete with the submittal of the RIR Addendum. During the June 6, 2018 conference call, the USEPA agreed that this comment did not intend to indicate that further remedial investigation is necessary. Rather, the comment is referring to the need for sentinel wells as part of the remedial action alternatives evaluation. The wording in the first bullet under the 1,4-dioxane subheading has been edited to refer to sentinel wells.

14. Page 29, Section 5 - A conclusion as to the disposition of free cyanide should be included in the groundwater quality section.

The first paragraph in Section 5 has been edited to indicate that free cyanide was not detected.

15. Page 29, Groundwater Quality, Benzene – The second bullet should be revised to note that benzene has been detected at levels which exceed the GWQS of 1 ug/L.

The wording in the second bullet has been revised to read as follows:

- Overall, benzene concentrations above the GWQS of 1 ug/L have been found primarily in the PMP Area, are generally found in low concentrations, and are limited in areal extent.

16. Table 2 - With respect to 1,4-Dioxane, information should be added to the column one indicating how the sample was analyzed...e.g. 8260 SIM, 8270 SIM, 8270 SIM w/ ID, etc. The testing method should be included next in the parameter column.

The footnotes were intended to clarify analytical methods, but the analytical methods have been further clarified in Table 2 by adding rows as applicable, since adding rows provides an easier manner in which to illustrate the data since this clarification applies only to 1,4-dioxane.

17. Tables 4 and 8 - Table 4 shows a 1,4-Dioxane concentration of 130 E ug/L for the air shaft in August 2017. Table 8 shows a concentration of 144 ug/L. Please rectify.

The correct result is 144 ug/L, and has been corrected in Table 5 (table re-numbered to account for a new well search table). The 144 ug/L concentration is from an Alpha Analytical laboratory analysis, and Alpha Analytical is the laboratory that has been used for 1,4-dioxane analyses because it is certified for Method 8270 SIM with isotope dilution. The 130E result is from a TestAmerica laboratory analysis, inadvertently pulled from the database. TestAmerica was in the process of becoming certified for Method 8270 SIM with isotope dilution and was asked to perform certain analyses as a QC check on TestAmerica's newly acquired certification.

18. Figure 1 - It is difficult to make out the well designations and locations in the PMP area on this map. A larger map for the PMP and OCDA should be included in this report.

The larger scale maps for the PMP, OCDA, and CMP have been provided in the 2017 sample results figures that have been added to the main body of the RIR Addendum.

19. *Biochlor Simulations - The longitudinal dispersivity value of 90 ft seems high for a fractured rock scenario. This would be more indicative of an unconsolidated medium. Using the dispersivity calculation offered by Shulze-Makuch (Groundwater, 2005) for granite yields a longitudinal dispersivity value of approximately 15 ft. The Xu and Eckstein formula in Biochlor yields a value of 23 ft. Please rationalize the selection of the 90 ft dispersivity value. Also explain why the dispersivity values were not varied like the other input parameters.*

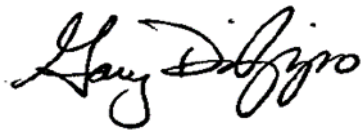
Per the BIOCHLOR user's manual, a common estimate of longitudinal dispersivity is 10% of the estimated plume length (Option 2 in BIOCHLOR). As described in the RIR Addendum, a plume length of 900 feet was estimated based on the empirical analytical data at down-gradient monitoring well RW-16. BIOCHLOR then used 10% of this

estimated length or 90 feet. The Xu and Eckstein formula in BIOCHLOR is Option 3 for estimating dispersivity. However, using a lower estimate of longitudinal dispersivity results in a shorter plume length. So, the option selected for the modeling was the most conservative of the modeling options for longitudinal dispersivity within BIOCHLOR and was selected on that basis.

Please contact us if you have questions or comments on this response to comments or the revised RIR Addendum.

Sincerely,

CORNERSTONE ENVIRONMENTAL GROUP, LLC



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Enclosure

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